

MATERIAL SAFETY DATA SHEET

SRM Supplier: National Institute of Standards and Technology
Standard Reference Materials Program
100 Bureau Drive, Stop 2320
Gaithersburg, Maryland 20899-2320

SRM Number: 4334H
MSDS Number: 4334H
SRM Name: Plutonium-242
Radioactivity Standard
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SECTION I. MATERIAL IDENTIFICATION

Material Name: Plutonium-242 Radioactivity Standard

Description: SRM 4334H consists of radioactive plutonium-242 nitrate and nitric acid dissolved in 5 mL of distilled water. The resulting solution contained in a flame-sealed borosilicate ampoule contains nitric acid with a concentration of 3 moles per liter of water.

Other Designations: Plutonium-242 in Nitric Acid (aqua fortis; hydrogen nitrate; azotic acid; engravers acid) Solution

Name	Chemical Formula	CAS Registration Number
Nitric Acid	HNO ₃	7697-37-2

DOT Classification: Nitric Acid, UN2031

SRM 4334H is a radioactive material with a massic activity of approximately 26.31 Bq/g. The hazard information supplied in this MSDS is for the Chemical Hazard Only! For the hazard documentation concerning the radioactive material, refer to the packaging information and insert sheet.

SECTION II. HAZARDOUS INGREDIENTS

Hazardous Components	Nominal Concentration (mol/L)	Exposure Limits and Toxicity Data
Nitric Acid	3.2	OSHA-TWA: 5 mg/m ³
		ACGIH-TWA: 5 mg/m ³
		UK OES-TWA: 5 mg/m ³
		Human, Oral: LD ₅₀ : 430 mg/kg
Plutonium-242	8×10 ⁻⁷	Radionuclide*

*** For the radiation hazard of SRM 4334H, refer to the packaging information and insert sheet.**

NOTE – SRM 4334H incorporates lead compounds and other heavy elements below the reportable limit (0.1 % for chemicals identified as carcinogens) required by OSHA according to 29 CFR 1910.1200 (g)(2)(i)(C)(1) for individual MSDS information. For the list and actual concentration of these compounds, refer to the corresponding NIST Certificate of Analysis

SECTION III. PHYSICAL/CHEMICAL CHARACTERISTICS

Nitric Acid
Appearance and Odor: a colorless to slightly yellow liquid a pungent odor
Relative Molecular Mass: 63.01
Density (g/mL): 1.105
Solubility in Water: soluble
Solvent Solubility: miscible in ether

SECTION IV. FIRE AND EXPLOSION HAZARD DATA

Flash Point: N/A

Method Used: N/A

Autoignition Temperature: N/A

Flammability Limits in Air (Volume %): UPPER: N/A
LOWER: N/A

Unusual Fire and Explosion Hazards: Although nitric acid does not burn, it is a powerful oxidizing agent that can react with combustible materials to cause fires.

Extinguishing Media: Use extinguishing media that is appropriate to the surrounding fire. Use a water spray to dilute nitric acid and to absorb liberated oxides of nitrogen.

Special Fire Procedures: Fire fighters should wear a self-contained breathing apparatus (SCBA) with a full face piece in the pressure demand or positive mode and other protective clothing.

SECTION V. REACTIVITY DATA

Stability: ☒ Stable ☐ Unstable

Conditions to Avoid: Avoid contact with combustible and other incompatible materials.

Incompatibility (Materials to Avoid): Keep nitric acid away from organic materials, plastics, rubber, and some forms of coatings. Nitric acid is incompatible with chlorine and metal ferrocyanide.

See Section IV: *Unusual Fire and Explosion Hazards*.

Hazardous Decomposition or Byproducts: Hazardous decomposition of nitric acid can produce various nitrogen oxides, including nitric oxide (NO), nitrogen dioxide (NO₂), nitrous oxide (N₂O), as well as nitric acid mist or vapor.

Hazardous Polymerization: ☐ Will Occur ☒ Will Not Occur

SECTION VI. HEALTH HAZARD DATA

Route of Entry: ☒ Inhalation ☒ Skin ☒ Ingestion

Health Hazards (Acute and Chronic): Nitric acid may be fatal if inhaled, swallowed, or absorbed through the skin. This material causes burns and is extremely destructive to the mucous membranes and upper respiratory tract, eyes, and skin. Inhalation may be fatal as a result of spasm, inflammation, and edema of the larynx and bronchi, chemical pneumonitis, and pulmonary edema. Symptoms of exposure may include burning sensation, coughing, wheezing, laryngitis, shortness of breath, headache, nausea, and vomiting.

Medical Conditions Generally Aggravated by Exposure: Eye disorders, respiratory disorders, skin disorders, and allergies.

Listed as a Carcinogen/Potential Carcinogen:

	Yes	No
In the National Toxicology Program (NTP) Report on Carcinogens	_____	<u>X</u>
In the International Agency for Research on Cancer (IARC) Monographs	_____	<u>X</u>
By the Occupational Safety and Health Administration (OSHA)	_____	<u>X</u>

EMERGENCY AND FIRST AID PROCEDURES:

Skin Contact: Remove contaminated shoes and clothing. Rinse affected area with large amounts of water followed by washing the area with soap and water. Watch for chemical irritations and treat them accordingly. Obtain medical assistance if necessary.

Eye Contact: Immediately flush eyes, including under the eyelids, with copious amounts of water for at least 15 minutes. Obtain medical assistance.

Inhalation: If inhaled, move the victim to fresh air. If breathing is difficult, give oxygen; if the victim is not breathing, give artificial respiration by qualified personnel. Obtain medical assistance immediately.

Ingestion: If ingestion occurs, wash out mouth with water. Drink plenty of water. **DO NOT** induce vomiting. Obtain medical assistance immediately.

TARGET ORGAN(S) OF ATTACK: Skin, teeth, eyes, and upper respiratory tract.

SECTION VII. PRECAUTIONS FOR SAFE HANDLING AND USE

Steps to be Taken in Case Material is Released or Spilled: Notify safety personnel of spills. Handle spills according to radioactive materials spill procedures.

Waste Disposal: Follow all federal, state, and local laws governing disposal of radioactive materials. Keep out of sewers and water supplies.

Handling and Storage: The sample container should be handled by persons qualified to handle both radioactive material and strong acid solutions. Provide local exhaust or process enclosure ventilation system to ensure compliance with applicable exposure limits. Provide approved respiratory apparatus for non-routine or emergency use. Wear chemical resistant gloves and chemical safety glasses where contact with the liquid or high vapor concentrations may occur. An eye wash station and washing facilities should be readily available near handling and use areas.

NOTE: Contact lenses pose a special problem; soft lenses may absorb irritants and all lenses concentrate them. **DO NOT** wear contact lenses in the laboratory.

This material should be stored and used at a temperature between 5 °C and 65 °C.

SECTION VIII. SOURCE DATA/OTHER COMMENTS

Sources: MDL Information Systems, Inc., MSDS *Nitric Acid*, 18 March 2004.

Disclaimer: Physical and chemical data contained in this MSDS are provided only for use in assessing the hazardous nature of the material. The MSDS was prepared carefully, using current references; however, NIST does not certify the data on the MSDS. The certified values for this material are given in the NIST Certificate of Analysis.